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The Missouri Muhlenbergias.

BY BENJAMIN FRANKLIN BUSH.

Any one in recent years attempting to name specimens of MUHLENBERGIA by the books, must have been struck by the wide difference of opinion in the presentation of the species in the Robinson and Fernald Gray's New Manual, and the Britton and Brown Illustrated Flora. This difference of opinion in treating the species of this genus in some cases is so marked as to cause one to wonder if there is not something wrong with our understanding of the species. This difference of opinion is most marked with the members of the *Mexicana* group, a most perplexing and critical one, the species of which present so many variations in culms, leaves and floral characters.

It was formerly thought that the species of this, and those of the *Acroxis* group, were either awned or awnless, this belief causing much confusion in the treatment of the species and the naming of specimens: but it began to be suspected that those species which were habitually awnless sometimes presented awned forms, and those species that were ordinarily awned, sometimes presented awnless forms. This suspicion was first voiced by Scribner,¹ who announced that *M. MEXICANA* and *M. SOBOLIFERA* often or occasionally presented awned forms, and he went so far as to describe awned forms of these species,² and noted that *M. TENUI-FLORA* and *M. TORREYI* were occasionally awnless.

My conclusions after a careful examination of several hundred sheets of specimens, are, that Scribner was correct in the main, but that what he took to be awned forms or varieties of *M. MEXICANA* and *M. SOBOLIFERA* are really good distinct species, which I herein propose as new.

¹ Scribner, *Rhodora* 9:18. 1907.

² Scribner, *Rhodora* 9:18. 1907.

Hitchcock in the Robinson and Fernald Gray's New Manual in 1908, presented ten species and one variety for the territory commonly embraced in the Manual region, presenting *M. FOLIOSA* Trinius, for the first time, this having been previously restored by Scribner,¹ and to it he referred *M. AMBIGUA* Torrey, which I am inclined to think is a good species. *M. MEXICANA* is there said to have the culms retrorsely strigose below the nodes, and to have the lemmas acuminate or awned, thus including the *M. MEXICANA COMMUTATA* of Scribner in his description. It appears to me much better to consider Scribner's variety a distinct species, and thus relieve the real *M. MEXICANA* of much uncertainty. Hitchcock also includes *M. POLYSTACHYA* of Mackenzie and Bush in *M. MEXICANA*, which after an examination of a number of specimens I still consider distinct from that species. He reduces *M. PALUSTRIS* to a variety of *M. SCHREBERI*, a disposition once made by Scribner,² but it seems more natural to keep this distinct from that species. The description of *M. SCHREBERI* is so drawn as to include *M. SCHREBERI CURTISETOSA* of Scribner, which seems to me to be sufficiently distinct to recognize as a species. *M. GLABRIFLORA* of Scribner is not mentioned in the Manual, Hitchcock evidently not understanding this species.

Nash in the Britton and Brown Illustrated Flora, second edition, in 1913, presents eleven species, ten of these given by Hitchcock in the Manual, and one other, *M. AMBIGUA* Torrey. In the treatment of the species in this work, Nash gives specific rank to *M. PALUSTRIS* and *M. AMBIGUA*, refers *M. FOLIOSA* of Trinius to *M. MEXICANA*, ignores *M. POLYSTACHYA* of Mackenzie and Bush, and *M. SCHREBERI CURTISETOSA*, and briefly mentions *M. GLABRIFLORA* which seems to me to be an excellent species. In his description of the *MEXICANA* group, Nash does not speak of the retrorsely scabrous character of the culms just below the nodes of some of the species, evidently thinking this character not worthy of mention.

Many years ago Prof. Dewey wrote the account of the Grasses for the Manual of the Plants of Western Texas,³ in which the ranges of some of our species is given, no doubt based on specimens in the Herbarium of the Department of Agriculture. The ranges given of several of our species in this work has been modified largely by

¹ Scribner, Rhodora 9:18. 1907.

² Scribner, Rhodora 9:18. 1907.

³ Dewey, Man. of the Plants of Western Texas, 1892.

numerous collections and critical study of several species. Prior to 1905, several of the species now included in the genus MUHLENBERGIA, were included in the genus *Sporobolus*, when Dr. Rydberg¹ transferred some of the species to this genus. These species seem to me to be intermediate between MUHLENBERGIA and *Sporobolus*, and could with equal propriety be included in the genus *Sporobolus* or in MUHLENBERGIA, but I leave these species in MUHLENBERGIA as placed there by Dr. Rydberg. But there is a group of species having single, terminal panicles with flowers on long capillary pedicels, the type of which is *Stipa capillaris* Lamarck, that seems to me to be very distinct from the other species commonly included in the genus MUHLENBERGIA. This group of species is so distinct from the other species of MUHLENBERGIA in rootstocks, ligules, panicles, flowers and habit, that I think there is no doubt that they are certainly distinct from that genus. The earliest available name for this group of species seems to be *PODOSEMUM* Desvaux, in *Nouv. Bull. Soc. Philom.* 2:188. 1810, where the genus is established and *Stipa capillaris* Lamarck is cited as the type. The genus is more fully described in Beauvois *Agrost.* 29, 1812.

I have therefore decided to follow Desvaux in placing some of the species formerly included in the genus MUHLENBERGIA in the genus *PODOSEMUM*, but present the single species occurring in the State along with the other species of MUHLENBERGIA, to which it has generally been referred.

In this, my presentation of the Missouri species, I differ somewhat from the treatment of both Hitchcock and Nash, in the works mentioned above, and have more nearly agreed with Scribner in recognizing the species, and have been compelled to describe one new species, being unable to refer the specimens to any described species.

I have seen nearly all the Missouri material in existence of the species of MUHLENBERGIA, through the kindness of Dr. J. M. Greenman, curator of the Missouri Botanical Garden Herbarium, Prof. A. S. Hitchcock, Agrostologist in charge of the Grasses in the United States National Museum Herbarium, Prof. Wm. Trelease of the University of Illinois, Dr. J. A. Nieuwland of the University of Notre Dame, and Mr. Kenneth K. Mackenzie of East Orange, New Jersey, to whom I am under many obligations;

¹ Rydberg, *Bull. Torr. Club*, 32:1905.

to Prof. Hitchcock and Dr. George T. Moore of the Missouri Botanical Garden, I am under obligations for numerous citations furnished and for verifications of publications; to all of the above I herein return thanks for the many courtesies extended.

For the Missouri species now included, or were formerly included, in the genus MUHLENBERGIA, I offer the following:

KEY TO THE MISSOURI MUHLENBERGIAS.

Panicles contracted, narrow, often numerous, often slender, the branches short, erect or appressed; ligules usually short or minute.

1. MUHLENBERGIA.

Panicles open, single, terminal, very large, their branches long and spreading, slender, the pedicels hair-like, drooping; ligules elongated; lemmas with long awns.

2. PODOSEMUM.

1. MUHLENBERGIA SCHREBER; Gmelin, Syst. Nat. 2:171. 1791.

A genus of about 30 species, mostly American, a few Asiatic, divisible into several rather well-marked groups, the type-species MUHLENBERGIA SCHREBERI Gmelin. As here treated, the species naturally fall into four groups or sections as follows:

Glumes wanting, minute or very short, or in one species a little longer, blunt or obtuse or in one species acuminate; plants decumbent at the base, from weak or slender rootstocks; lemmas usually long-awned or in one species rather short-awned.

A. MUHLENBERGIA proper.

Glumes broad, ovate, acute, much shorter than the lemmas; lemmas acute or awned; rootstocks stout, scaly.

B. STENOCLADIUM section.

Glumes narrow, acuminate or aristate, nearly as long as or exceeding the lemmas in length; rootstocks stout, scaly.

C. ACROXIS section.

Glumes broad, cuspidate; panicle very much contracted, narrow; plants without rootstocks.

D. EUCLADIUM section.

A. MUHLENBERGIA proper.

Glumes less than one-fourth the length of the spikelets, minute or wanting, blunt or obtuse; lemmas with awns 3-5mm. long; rootstocks rather weak.

1. MUHLENBERGIA SCHREBERI.

Glumes one-fourth to one-half as long as the spikelets, ovate-acuminate; lemmas with awns 1-2 mm. long; rootstocks much stouter.

2. MUHLENBERGIA CURTISETOSA.

B. STENOCLADIUM section.

1. Spikelets 1.5-2mm. long; lemmas awnless; infranodes¹ minutely scabrous just below the glabrous nodes; glumes two-thirds to three-fourths as long as the scabrous lemmas, ovate to broadly lanceolate, cuspidate. 3. MUHLENBERGIA SOBOLIFERA.

1. Spikelets 2.5-4mm. long; lemmas awned or rarely awnless; glumes lanceolate or broadly lanceolate. 2.

2. Spikelets 2.5-3mm. long; infranodes glabrous; nodes glabrous; culms low, much-branched; panicles numerous, upper usually short-exserted; awns 3-4mm. long.

4. MUHLENBERGIA BRACHYPHYLLA.

2. Spikelets 3-4mm. long; infranodes retrorsely pubescent; nodes pubescent; culms usually tall, little branched; panicles usually few, usually long-exserted; glumes very broad, ovate-lanceolate, cuspidate, scabrous, clasping, one-half to two thirds as long as the scabrous slender lemmas; lemmas usually with long awns, rarely awn-pointed or awnless; awns 5-10mm. long.

5. MUHLENBERGIA TENUIFLORA.

C. ACROXIS section.

1. Glumes much exceeding the lemmas, generally twice as long, about 5mm. long, awned-acuminate; lemmas acuminate-attenuate.

6. MUHLENBERGIA RACEMOSA.

1. Glumes about as long as the lemmas, or slightly longer, or mostly a little shorter, less than 5mm. long, glabrous or rarely slightly scabrous. 2.

2. Panicles ovoid or subpyramidal, or sometimes linear, numerous, short-exserted, or partially included in the upper sheaths not dense nor glomerate-flowered. 3.

2. Panicles oblong or cylindrical, or sometimes linear, more or less glomerate, or sometimes loosely flowered. 5.

3. Panicles numerous, rather long, more or less open; lemmas long-awned.

7. MUHLENBERGIA COMMUTATA.

¹The term infranode is here employed to designate that portion of the culm just below the node, corresponding to the upper part of the internode.

3. Panicles numerous, rather short, somewhat dense or more or less open; lemmas not awned. 4.

4. Panicles numerous, rather short, more or less dense; lemmas not awned, perfectly glabrous. 8. MUHLENBERGIA GLABRIFLORA

4. Panicles numerous, more or less open, often slender; lemmas not awned, pubescent at the base; infranodes perfectly smooth; nodes glabrous. 9. MUHLENBERGIA MEXICANA.

5. Panicles few, short, dense, glomerate, oblong or cylindrical; flowers usually purplish; lemmas awn-pointed or somewhat aristate; glumes mucronate or aristate, subequal; infranodes retrorsely scabrous: nodes glabrous.

10. MUHLENBERGIA FOLIOSA.

5. Panicles numerous or sometimes fewer, filiform, linear or oblong, dense or rather loose. 6.

6. Panicles usually few, usually short-exserted, linear or filiform; infranodes retrorsely scabrous; nodes glabrous; flowers not crowded, in rather long, erect branches, usually green or stramineous; spikelets 2.5-3mm. long; lemmas usually long-awned, or rarely awnless. 11. MUHLENBERGIA TORREYI.

6. Panicles numerous, dense, slender, elongated, usually long-exserted; infranodes minutely scabrous or nearly glabrous; lemmas acuminate, rarely awned, villous with very long hairs at the base; spikelets 2-2.5mm. long. 12. MUHLENBERGIA POLYSTACHYA.

D. EUCLADIUM section nova.

Culms strictly erect, not rooting at the lower nodes, minutely retrorsely puberulent; glumes broad, one-half as long as the spikelet or more, acuminate or cuspidate; lemmas awnless, long-acuminate or cuspidate; no creeping scaly rootstocks; panicles slender, the branches appressed. 13. MUHLENBERGIA CUSPIDATA.

1. MUHLENBERGIA SCHREBERI J. F. Gmelin, Syst. Nat. 2:171. 1791.

Muhlenbergia diffusa Willd. Sp. Pl. 1:320. 1798.

Dilepyrum minutiflorum Michx. Fl. Bor. Am. 1:40. 1803.

Muhlenbergia diffusa Schreber, Gram. 2:143, 1810.

Muhlenbergia diffusa Schreb., Bush in Flora of Jackson County, Missouri, No. 864, 1885; Tracy in Flora of Missouri, No 1641, 1886; Eggert in Catalogue of Plants of Saint Louis, Missouri, 1891; Daniels in Flora of Columbia, Missouri, No. 75, 1907; Palmer in

Catalogue of Plants of Jasper County, Missouri, Nos. 988, 990 and 3488, 1916.

Muhlenbergia diffusa Willd., Mackenzie and Bush in Manual of the Flora of Jackson County, Missouri, No. 6, 1902.

Muhlenbergia Schreberi J. F. Gmelin, Palmer in Catalogue of Plants of Jasper County, Missouri, Nos. 1376, 2646 and 2894, 1916.

Northern Texas and northward, Dewey in Manual of the Plants of Western Texas.

Me. to Ont. Minn. and southward, Hitchcock in Manual.

Me. and southern Ontario to Minn. Fla. Kans. and Texas, Nash in Flora.

Me. to Minn. south to Fla. and Texas, Nash in Illustrated Flora.

Massachusetts to Nebraska, south to Florida, Texas and Mexico.

SPECIMENS EXAMINED:

MASSACHUSETTS:

Amherst, *Girard* 40, 1872, M. B. G. Herb. No. 80109;

Farmington, *Smith*, September, 1897, M. B. G. Herb. No. 79741.

NEW YORK:

Buffalo, *Clinton*, date not given, M. B. G. Herb. N. 79859;

Pennyan, *Sartwell*, date not given, M. B. G. Herb. No. 79625, the plant marked 1 on this sheet;

Pennyan, *Sartwell*, date not given, M. B. G. Herb. No. 79582, the plant marked 1 on this sheet.

NEW JERSEY:

Hoboken, collector and date not given, M. B. G. Herb. No. 79991;

Hoboken, collector and date not given, M. B. G. Herb. No. 79989;

Hoboken, collector and date not given, M. B. G. Herb. No. 79974; 5

Hoboken, collector and date not given, M. B. G. Herb. No. 79889;

Pemberton, *Willmarth*, August 25, 1876, U. S. Herb.; Without definite locality, *Digyn*, date not given, M. B. G. Herb. No. 79974.

PENNSYLVANIA:

- Manayunk, *Redfield*, September 19, 1870, M. B. G. Herb.
No. 79858;
Philadelphia, *Digyn*, date not given, M. B. G. Herb.
No. 79887;
Philadelphia, *Scribner* 313, October, 1881, U. Ill. Herb.;
Stoneroad's Mill, *Keller*, October 5, 1901, M. B. G. Herb.
No. 79868;
West Chester, *W. D.*, date not given, M. B. G. Herb.
No. 79773;
Without definite locality, *Sartwell*, date not given.
M. B. G. Herb. No. 79776;
York County, *Glatfelter*, September, 1899, M. B. G. Herb.
No. 80096;

MARYLAND:

- Chevy Chase, *Mosher*, September 15, 1915, U. Ill. Herb.;
Harper's Ferry, *Holm*, October 6, 1912, M. B. G. Herb.
No. 779204.

DISTRICT OF COLUMBIA:

- Great Falls of the Potomac, *Holm*, October, 1913, U. Ill.
Herb.; Pine Branch, Ball 54, August 25, 1909, M. B. G.
Herb. No. 79872.

OHIO:

- Cincinnati, *Lloyd* 575, September 9, 1890, M. B. G. Herb.
No. 79885.

VIRGINIA:

- Loudoun County, *Helms*, August, 1888, U. Ill. Herb.;
Munden, *Mackenzie* 1764, September 3-19, 1905, M. B. G.
Herb. No. 79843.,

TENNESSEE:

- Knoxville, *Ruth* 59, September, 1898, M. B. G. Herb. No.
79867.

KENTUCKY:

- Bowling Green, *Price*, June 1890, M. B. G. Herb. No.
79847;
Bowling Green, *Price*, May, 1897, M. B. G. Herb. No.
79846.
Wasiota, *Kearney* 383, September, 1893, M. B. G. Herb.
No. 79992.

ILLINOIS:

- Lisle, *Umbach*, July 4, 1896, M. B. G. Herb. No. 80090;
Mascoutah, *Welsch*, 1862-1871, U. Ill. Herb.;
Mount Carmel, *Schneck*, September 15, 1904, U. Ill. Herb.;
Peoria, *Brendel*, date not given, U. Ill. Herb.;
St. Clair County, *Eggert*, September 11, 1877, M. B. G.
Herb. No. 739941;
St. Clair County, *Eggert*, September 11, 1877, M. B. G.
Herb. No. 739683.
St. Clair County, *Eggert*, September 11, 1877, M. B. G.
Herb. No. 739391;
St. Clair County, *Eggert*, September 11, 1877, M. B. G.
Herb. No. 79851;
St. Clair County, *Eggert*, September 11, 1877, M. B. G.
Herb. No. 79841;
St. Clair County, *Eggert*, September 11, 1877, M. B. G.
Herb. No. 79854;
Taylorville, *Andrews*, August 28, 1898, U. Ill. Herb;
Urbana, *Gibbs*, September 26, 1898, U. Ill. Herb;
Urbana, *G. P. C.* October 1, 1895, U. Ill. Herb;
Urbana, *Seymour*, September 28, 1880, U. Ill. Herb.
Wabash County, *Schneck*, July, 1900, U. Ill. Herb;
Wabash County, *Schneck*, date not given, U. Ill. Herb.;
Wady Petra, *Chase* 1165, September 25, 1904, U. Ill. Herb.;
Wady Petra, *Chase* 1270, September 23, 1906, U. Ill. Herb.;
Wady Petra, *Chase* 1277, October 7, 1906, U. Ill. Herb.;
Wady Petra, *Chase* 682, October 7, 1906, M. B. G. Herb.
No. 80128.

MISSOURI:

- Aberdeen, *Davis* 1147, September 24, 1911, M. B. G. Herb.
No. 709388;
Allenton, *Letterman*, August 30, 1892, M. B. G. Herb.
No. 709388;
Campbell, *Bush*, September 11, 1893, M. B. G. Herb.
No. 772800
Cartersville, *Palmer* 1984, July 8, 1901, M. B. G. Herb.
No. 757390;
Carthage, *Trelease*, September 18, 1998, M. B. G. Herb.
No. 79864;

- Cedar County, *Trelease*, July 30, 1897 M. B. G. Herb. No. 79862;
Clayton, *Letterman*, date not given, M. B. G. Herb. No. 796012;
Cliff Cave, *Kellogg* 30, October 10, 1901, U. S. Herb. No. 950188;
Cliff Cave, *Kellogg*, October 10, 1901, M. B. G. Herb. No. 79798;
Congo, *Hoffman*, October 10, 1916;
Dodson, *Hoffman*, September 13, 1916;
Dunklin County, *Trelease*, August 20, 1897, M. B. G. Herb. No. 79861;
Eolia, *Davis* 1435, October 23, 1911, U. S. Herb. No. 674025;
Eolia, *Davis* 1435, October 23, 1911, M. B. G. Herb. No. 709445;
Forest Park, *Eggert*, September 21, 1875, M. B. G. Herb. No. 79855;
Galena, *Palmer* 6481, October 16, 1913, M. B. G. Herb. No. 717420;
Galloway, *Standley* 9345, August 26, 1912, U. S. Herb. No. 688260;
Greene County *Blankinship* 2821, July 29, 1889, M. B. G. Herb. No. 80047;
Indian Hill, *Trelease*, September 28, 1897, M. B. G. Herb. No. 79863;
Jackson County, *Bush*, September 27, 1893, M. B. G. Herb. No. 80049;
Jefferson County, *Eggert*, September 9, 1896, M. B. G. Herb. No. 79849;
Jerome, *Kellogg*, 184, October 1, 1913, M. B. G. Herb. No. 719727;
Martin City, *Mackenzie* 482, September 18, 1901;
McDonald County, *Bush* September 1, 1893, M. B. G. Herb. No. 80046;
Monteer, *Bush* 4888, October 10, 1907, M. B. G. Herb. No. 79831;
Oronogo, *Palmer*, 988, September 15, 1907, M. B. G. Herb. No. 757385;
Oronogo, *Palmer* 988, September 15, 1907, M. B. G. Herb. No. 79828;

- Prosperity, *Palmer* 990, August 20, 1907, M. B. G. Herb.
No. 757389;
Prosperity, *Palmer* 990, August 20, 1907, M. B. G. Herb.
No. 79827;
Silica, *Eggert*, September 15, 1891, M. B. G. Herb. No.
79851;
South St. Louis, *Kellogg*, September 7, 1900, M. B. G.
Herb. No. 79877;
Springfield, *Standley*, 9728, August 31, 1912, U. S. Herb.
No. 688645;
St. Louis, *Eggert*, October, 1875, M. B. G. Herb. No. 82696;
St. Louis *Engelmann*, August 1841,, M. B. G. Herb. No.
79688;
St. Louis, *Glatfelter*, date not given, M. B. G. Herb. No.
80060;
St. Louis, *Pammel*, October, 1886, M. B. G. Herb. No
79842;
Stone County *Trelease*, September 10, 1898, M. B. G.
Herb. No. 79865;
Sugar Creek, *Mackenzie*, September 6, 1896;
Swan, *Bush*, 380, September 24, 1899, M. B. G. Herb.
No. 79857;
Thornton, *Mackenzie* 656, October 18, 1901, M. B. G.
No. 79865;
Turner, *Standley* 8794, September 4, 1912, U. S. Herb.
No. 687669;
Webb City, *Palmer* 1376, June 7, 1908, M. B. G. Herb.
No. 757388;
Webb City, *Palmer* 2646, September 8, 1909, M. B. G.
Herb. No. 80063;
Webb City, *Palmer* 2646, September 8, 1909, M. B. G. Herb.
No. 757391;
Webb City, *Palmer* 3488, October 7, 1911, M. B. G. Herb.
No. 709005;
Webb City, *Palmer* 3488, October 7, 1911, M. B. G. Herb.
No. 757386;
Whiteside, *Davis* 28, September 12, 1911 M. B. G. Herb.
No. 765895;
Whiteside, *Davis* 1008, September 12, 1911 M. B. G. Herb.
No. 673927;

Whiteside, *Davis* 1008, September 12, 1911, M. B. G. Herb. No. 709063;

NORTH CAROLINA:

Aiken, *Ravenel*, September, 1866, M. B. G. Herb. No. 79691.

IOWA:

Ames, *Pammel* 73, August, 1909, M. B. G. Herb. No. 80074;
Clinton, *Pammel* 247, September 4, 1896, M. B. G. Herb. No. 79980;

Clinton, *Pammel* 247, September 4, 1896, M. B. G. Herb. No. 79850;

College Park, *Johnson*, October 1898, M. B. G. Herb. No. 79884;

Columbus Junction, *Pammel* 1502, date not given, M. B. G. Herb. No. 79876;

Des Moines, *Pammel* 653, July 14, 1897, M. B. G. Herb. No. 79848;

DeWitt, *Pammel* 1455, September 9, 1898, M. B. G. Herb. No. 79874;

Dixon, *Snyder* 735, September 23, 1897, M. B. G. Herb. No. 79882;

Iowa City, *Hitchcock*, 1888, M. B. G. Herb. No. 79879;

Iowa City, *Hitchcock*, date not given, M. B. G. Herb. No. 79983;

Iowa City, *Hitchcock*, date not given, M. B. G. Herb. No. 79982;

Iowa City, *Hitchcock*, date not given, M. B. G. Herb. No. 79746;

Mount Ayr, *Beard* 642, September 25, 1907, M. B. G. Herb. No. 79722;

Mount Pleasant, *Witte* 993, October 1, 1897, M. B. G. Herb. No. 79881;

Muscatine, *Mackenzie* 749, September 10, 1894.

NEBRASKA:

Bellevue, *Hayden*, July, 1853-54, M. B. G. Herb. No. 79690;

GEORGIA:

Leslie, *Harper* 1716, October 7, 1902, M. B. G. Herb. No. 79869;

(To be continued.)